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(Emphasis added)

Claim 9 recites:

"A surface acoustic wave device comprising:
 a quartz substrate;
 a piezoelectric thin film disposed on said quartz substrate;
**comb electrodes disposed between said quartz substrate and
 said piezoelectric thin film; and**
**the normalized film thickness H/λ of said piezoelectric thin film
 is at least about 0.20, wherein the film thickness of said piezoelectric
 thin film is H , and the wavelength of a surface acoustic wave is λ ;**
wherein
the Euler angles of said quartz substrate are within the range
such that the power flow angle PFA of a Rayleigh wave is within
about $\pm 2.5^\circ$; and
the Euler angles of said quartz substrate are within the range
such that the electromechanical coupling coefficient for a spurious
wave K_{sp}^2 is not larger than about 0.05%." (Emphasis added)

Claim 14 recites:

"A surface acoustic wave device, comprising:
 a quartz substrate;
 a piezoelectric thin film disposed on said quartz substrate;
**comb electrodes disposed between said quartz substrate and
 said piezoelectric thin film; and**
**the normalized film thickness H/λ of said piezoelectric thin film
 is at least about 0.20, wherein the film thickness of said piezoelectric
 thin film is H , and the wavelength of a surface acoustic wave is λ ;**
wherein
the Euler angles of said quartz substrate are within a range
such that the power flow angle PFA of a Rayleigh wave is within
about $\pm 2.5^\circ$;
said range of the Euler angles set such that the PFA is within
about $\pm 2.5^\circ$ is within an area surrounded by lines which are
represented by the following equations:
 $\theta = 201.77292 - 8.1909\psi + 0.3257\psi^2 -$
 $0.00532\psi^3 + 0.0000286691\psi^4$ and $3 \leq \psi \leq 40$;
 $\theta = -2.3333\psi + 221.33$ and $40 \leq \psi \leq 43$;
 $\theta = -20.667\psi + 1009.7$ and $43 \leq \psi \leq 44.5$;
 $\psi = 242.92932 - 2.46296\theta - 0.04285\theta^2 + 0.000792121\theta^3 -$
 $0.00000316309\theta^4$ and $60 \leq \psi \leq 106$;
 $\theta = 60$ and $28 \leq \psi \leq 70$;

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$\theta = 1.39744 \cdot \psi^2 - 78.37179 \cdot \psi + 1158.8$ and $27.5 \leq \psi \leq 32$;
 $\theta = 9.8429 + 15.55204 \cdot \psi - 1.0153 \cdot \psi^2 + 0.0306 \cdot \psi^3 - 0.00038175 \cdot \psi^4$
 and $3 \leq \psi \leq 32$;
 $\theta = 60$ and $0 \leq \psi \leq 4$;
 $\psi = 0$ and $60 \leq \theta \leq 180$;
 $\theta = 180$ and $0 \leq \psi \leq 4$; and
 the Euler angles of said quartz substrate are within a range
 such that the electromechanical coupling coefficient for a spurious
 wave, K_{sp}^2 is not larger than about 0.05%;
 said range of the Euler angles set such that K_{sp}^2 is not larger
 than about 0.05% is within an area surrounded by lines which are
 represented by the following equations:
 $\theta = 461.5 - 51.23992 \cdot \psi + 3.55894 \cdot \psi^2 - 0.12153 \cdot \psi^3 + 0.00171 \cdot \psi^4$
 and $12 \leq \psi \leq 25.5$;
 $\theta = -10 \cdot \psi + 425$ and $24 \leq \psi \leq 25.5$;
 $\theta = -88.97104 + 38.79904 \cdot \psi - 1.80561 \cdot \psi^2 + 0.03334 \cdot \psi^3 -$
 $0.000217323 \cdot \psi^4$ and $27 \leq \psi \leq 43$;
 $\theta = -0.013928594 \cdot \psi^4 + 2.255507173 \cdot \psi^3 -$
 $136.803833233 \cdot \psi^2 + 3684.063042727 \cdot \psi - 37024.00$ and $33 \leq \psi \leq 43$;
 $\theta = 0.0009461088154 \cdot \psi^4 -$
 $0.178399621211 \cdot \psi^3 + 12.5950972795403 \cdot \psi^2 -$
 $395.999782194768 \cdot \psi + 4763.57$ and $33 \leq \psi \leq 55$;
 $\theta = 60$ and $29 \leq \psi \leq 55$;
 $\theta = 0.01724063 \cdot \psi^3 - 1.20723413 \cdot \psi^2 + 24.63357158 \cdot \psi - 58$ and 16
 $\leq \psi \leq 30$;
 $\theta = 0.0139 \cdot \psi^2 + 0.9028 \cdot \psi + 79$ and $79 \leq \psi \leq 100$;
 $\psi = 0$ and $78 \leq \theta \leq 180$;
 $\theta = 180$ and $0 \leq \psi \leq 13$;
 $\theta = 180$ and $24 \leq \psi \leq 29$." (Emphasis added)

The Examiner alleged that Kadota et al. (U.S. '5,432,392) teaches all of the
 features recited in claims 1, 9 and 14, except for the substrate being made of quartz,
 and a PFA in the range $\pm 2.5^\circ$. The Examiner further alleged that Kadota
 ("Combination...") teaches IDT electrodes and a quartz substrate. Thus, the Examiner
 concluded that it would have been obvious to modify the SAW device of Kadota et al.
 with the substrate of Kadota "for the purpose of miniaturizing the SAW device and
 obtaining a good temperature characteristic." The Examiner further alleged that,
 despite the fact that none of the cited prior art references teach or suggest any range of

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a PFA, it would have been obvious "to select the range of the PFA [of Kadota et al.] at $\pm 2.5^\circ$ since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable range involves only routine skill in the art." Applicants respectfully but strenuously disagree.

As will be explained in detail in the following paragraphs, the Examiner has improperly combined prior art references which cannot be combined, has failed to provide proper motivation to support the proposed combination of prior art, and has ignored clearly recited features of Applicants' claims.

The SAW devices of Kadota et al. ('392) and Kadota ("Combination...") have completely different configurations, and utilize completely different types of surface acoustic waves. Particularly, Kadota et al. ('392) utilizes Love waves, whereas Kadota ("Combination...") utilizes Rayleigh waves. Kadota ("Combinations...") fails to teach or suggest that the quartz substrate disclosed therein specifically for use with Rayleigh waves could or should be used in a SAW device utilizing Love waves. Thus, there is absolutely no teaching or suggest of the desirability of using a quartz substrate in the SAW device of Kadota et al. ('392), and thus, there would have been absolutely no motivation to combine the teachings of Kadota et al. ('392) and Kadota ("Combination..."). Obviousness cannot be established by combining the teachings of the prior art to produce the claimed invention, absent some teaching, suggestion or incentive supporting the combination. In re Geiger, 815 F.2d 686, 2 USPQ 1276, 1278 (Fed. Cir. 1987). Furthermore, Kadota et al. ('392) cannot be combined with Kadota ("Combination...") because the Rayleigh wave substrate of Kadota ("Combination...") cannot be used in the device of Kadota et al. ('392) which is specifically designed to propagate Love waves.

Instead of basing the conclusion of obviousness on actual teachings or suggestions of the prior art and the knowledge of one of ordinary skill in the art at the time the invention was made, the Examiner has improperly used Applicants' own invention as a guide. It is impermissible to use the claimed invention as an instruction manual or 'template' to piece together the teachings of the prior art so that the claimed invention is rendered obvious. This court has previously stated that one cannot use

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hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention. In re Fritch, 972 F.2d 1260, 23 USPQ 2d 1780, 1784 (Fed. Cir. 1992).

The Examiner's allegation that it would have been obvious "to select the range of the PFA [of Kadota et al.] at $\pm 2.5^\circ$ " is clearly improper. MPEP 2144.05 indicates that "a particular parameter must first be recognized as a result-effective variable, i.e. a variable which achieves a recognized result, before the determination of the optimum or workable ranges of said variable might be characterized as routine experimentation." In re Antonie, 559 F.2d 618, 195 USPQ 6 (CCPA 1977). Kadota et al. ('392) and Kadota ("Combination...") fail to teach or suggest any values for the PFA, and certainly fails to recognize that the PFA is a result-effective variable. Thus, Applicants respectfully submit that it would not have been obvious to select the range of the PFA of Kadota et al. ('392), as alleged by the Examiner.

In addition, as is clear from the Examiner's description of the prior art rejection of claims 1 and 3-14, the Examiner has completely ignored features which have been positively recited in the present claimed invention.

Specifically, the Examiner has completely ignored "the Euler angles of said quartz substrate are within the range such that the electromechanical coupling coefficient for a spurious wave K_{sp}^2 is not larger than about 0.05%" as recited in claim 9 of the present application, and "said range of the Euler angles set such that the PFA is within about $\pm 2.5^\circ$ is within an area surrounded by lines which are represented by the following equations:

$$\begin{aligned} &\theta = 201.77292 - 8.1909\psi + 0.3257\psi^2 - 0.00532\psi^3 + 0.0000286691\psi^4 \text{ and } 3 \leq \psi \leq 40; \\ &\theta = -2.3333\psi + 221.33 \text{ and } 40 \leq \psi \leq 43; \\ &\theta = -20.667\psi + 1009.7 \text{ and } 43 \leq \psi \leq 44.5; \\ &\psi = 242.92932 - 2.46296\theta - 0.04285\theta^2 + 0.000792121\theta^3 - 0.00000316309\theta^4 \text{ and } 60 \leq \psi \leq 106; \\ &\theta = 60 \text{ and } 28 \leq \psi \leq 70; \\ &\theta = 1.39744\psi^2 - 78.37179\psi + 1158.8 \text{ and } 27.5 \leq \psi \leq 32; \\ &\theta = 9.8429 + 15.55204\psi - 1.0153\psi^2 + 0.0306\psi^3 - 0.00038175\psi^4 \\ &\text{and } 3 \leq \psi \leq 32; \end{aligned}$$

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$\theta=60$ and $0 \leq \psi \leq 4$;

$\psi=0$ and $60 \leq \theta \leq 180$;

$\theta=180$ and $0 \leq \psi \leq 4$; and

the Euler angles of said quartz substrate are within a range such that the electromechanical coupling coefficient for a spurious wave, K_{sp}^2 is not larger than about 0.05%;

said range of the Euler angles set such that K_{sp}^2 is not larger than about 0.05% is within an area surrounded by lines which are represented by the following equations:

$\theta=461.5-51.23992*\psi+3.55894*\psi^2-0.12153*\psi^3+0.00171*\psi^4$ and $12 \leq \psi \leq 25.5$;

$\theta=-10*\psi+425$ and $24 \leq \psi \leq 25.5$;

$\theta=-88.97104+38.79904*\psi-1.80561*\psi^2+0.03334*\psi^3-0.000217323*\psi^4$ and $27 \leq \psi \leq 43$;

$\theta=-0.013928594*\psi^4+2.255507173*\psi^3-136.803833233*\psi^2+3684.063042727*\psi-37024.00$ and $33 \leq \psi \leq 43$;

$\theta=0.0009461088154*\psi^4-0.178399621211*\psi^3+12.5950972795403*\psi^2-395.999782194768*\psi+4763.57$ and $33 \leq \psi \leq 55$;

$\theta=60$ and $29 \leq \psi \leq 55$;

$\theta=0.01724063*\psi^3-1.20723413*\psi^2+24.63357158*\psi-58$ and $16 \leq \psi \leq 30$;

$\theta=0.0139*\psi^2+0.9028*\psi+79$ and $79 \leq \psi \leq 100$;

$\psi=0$ and $78 \leq \theta \leq 180$;

$\theta=180$ and $0 \leq \psi \leq 13$;

$\theta=180$ and $24 \leq \psi \leq 29$ °

as recited in claim in claim 14 of the present application.

The PTO has the burden under 35 U.S.C. §103 to establish a prima facie case of obviousness. See In re Piasecki, 745 F.2d 1468, 1471-72, 223 USPQ 785, 787-88 (Fed. Cir. 1984). The PTO can satisfy this burden only by showing some objective teaching in the prior art or that knowledge generally available to one of ordinary skill in the art would lead that individual to combine the relevant teachings of the references. See In re Fine, 837 F.2d 1071, 1074, 5 USPQ2d 1596, 1598 (Fed. Cir. 1984). This it has not done. The Examiner failed to cite prior art that remedies the deficiencies of Kadota et al. ('392) and Kadota ("Combination...") or that suggests the obviousness of modifying Kadota et al. ('392) and Kadota ("Combination...") to achieve Applicant's claimed invention.

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Prior art rejections must be based on evidence. Graham v. John Deere Co., 383 U.S. 117 (1966). Pursuant to MPEP 706.02(a), the Examiner is hereby requested to cite a reference in support of his position that it was well known at the time of Applicants' invention to set the K_{sp}^2 to be no larger than about 0.05% as recited in claim 9 of the present application, and to set the Euler angles in a range such that the PFA is within about $\pm 2.5^\circ$ and is within an area surrounded by lines which are represented by the equations recited in claim 14. If the rejection is based on facts within the personal knowledge of the Examiner, the data should be supported as specifically as possible and the rejection must be supported by an affidavit from the Examiner, which would be subject to contradiction or explanation by affidavit of Applicants or other persons. See 37 C.F.R. §1.104(d)(2).

Accordingly, Applicants respectfully submit that Kadota et al. ('392) and Kadota ("Combination..."), applied alone or in combination, fail to teach or suggest the unique combination and arrangement of elements recited in claims 1, 9 and 14 of the present application.

In view of the foregoing Amendments and Remarks, Applicants respectfully submit that Claims 1, 9 and 14 are allowable over the prior art for the reasons described above. Claims 3-8 and 10-13 are dependent upon claim 1, and are therefore allowable for at least the reasons that claim 1 is allowable.

In view of the foregoing Remarks, Applicants respectfully submit that this Application is in condition for allowance. Favorable consideration and prompt allowance are respectfully solicited.

To the extent necessary, Applicants petition the Commissioner for a Three-month extension of time, extending to July 29, 2003, the period for response to the Office Action dated January 29, 2003.

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The Commissioner is authorized to charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account No. 50-1353.

Respectfully submitted,

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